

CLAIMS

1. An input apparatus for detecting that the front surface of a panel is pressed or touched and inputting data corresponding to the detected result,
5 comprising:

a flexible wiring board on which a pattern of predetermined electrodes is formed and in which a pair of through-holes are aligned and formed; and

10 a piezoelectric actuator made of a piezoelectric bi-morph device, the piezoelectric actuator being configured to bridge the pair of the through-holes in the flexible wiring board, a part of the flexible wiring board being formed between the pair of the through-holes and positioned on the upper
15 surface of the piezoelectric actuator,

wherein the piezoelectric actuator is configured to contact the panel except for the part of the flexible wiring board.

2. The input apparatus as set forth in claim 1,
20 wherein the flexible wiring board is disposed so that the part formed between the pair of the through-holes contacts the panel.

3. The input apparatus as set forth in claim 1,
25 wherein the flexible wiring board is disposed so that the end portions of the piezoelectric actuator contact one surface of the flexible wiring board, the opposite surface of the flexible wiring board contacts

the panel.

4. The input apparatus as set forth in claim 1,
wherein wiring terminals are disposed at the
end portions of the piezoelectric actuator, the wiring
5 terminals being electrically connected to predetermined
electrodes formed on the flexible wiring board.

5. The input apparatus as set forth in claim 4,
wherein a resistor having a predetermined
resistance is connected in parallel with the electrodes
10 disposed on the flexible wiring board, the electrodes
being connected to the wiring terminals of the
piezoelectric actuator.

6. The input apparatus as set forth in claim 1,
wherein the part formed between the pair of
15 the through-holes in the flexible wiring board is
straightly cut therebetween.

7. The input apparatus as set forth in claim 6,
wherein wiring terminals formed at one end
portion of the piezoelectric actuator and predetermined
20 electrodes formed on the flexible wiring board are
soldered and electrically connected.

8. The input apparatus as set forth in claim 7,
wherein the other end portion of the
piezoelectric actuator contacts the flexible wiring
25 board, the other end portion of the piezoelectric
actuator and the contacted portion being folder-fixed

9. The input apparatus as set forth in claim 1,

wherein the distance between both the end portions of the pair of the through-holes is smaller than the length of the longitudinal direction of the piezoelectric actuator, the width of the pair of the through-holes being larger than the width of the piezoelectric actuator.

10. The input apparatus as set forth in claim 1, further comprising:

a display portion for displaying a screen through the panel,

wherein when the front surface of the panel is pressed or touched, an operation function item displayed on the display portion is selectively input corresponding to the position that is pressed or touched on the front surface of the panel, and

wherein the piezoelectric actuator is disposed outside a display area of the display portion means.

11. The input apparatus as set forth in claim 10,

wherein a plurality of the piezoelectric actuators are disposed around the display area of the display portion.

12. The input apparatus as set forth in claim 1,

wherein the panel is a touch panel that is configured to selectively input an operation function item corresponding to the position that is touched, the panel having a display portion for displaying a screen

through the touch panel and a holding portion being disposed outside the display area of the display portion and holding the display portion,

wherein when an operation function item
5 displayed on the display screen of the display portion is touched, the operation function item corresponding to the position that is touched is selectively input, and

wherein the touch panel is moved in the
10 vertical direction against the display surface of the display portion and the flexible wiring board is disposed between the touch panel and the holding portion.

13. The input apparatus as set forth in claim 12,
15 wherein a plurality of the piezoelectric actuators are disposed around the display area of the display portion.

14. A method for producing an input apparatus for detecting that the front surface of a panel is pressed
20 or touched and inputting data corresponding to the detected result, comprising the steps of:

forming a pair of through-holes aligned in a flexible wiring board on which a pattern of predetermined electrodes is formed;

25 inserting a piezoelectric actuator made of a piezoelectric bi-morph device into one of the pair of the through-holes and then the other from the opposite

surface side so that both the ends in the longitudinal direction of the piezoelectric actuator contact the same surface of the piezoelectric actuator; and

mounting the flexible wiring board on the panel so that the piezoelectric actuator contacts the panel except for a part formed between the pair of the through-holes in the flexible wiring board.

15. A method for producing an input apparatus for detecting that the front surface of a panel is pressed or touched and inputting data corresponding to the detected result, comprising the steps of:

forming a pair of through-holes aligned in a flexible wiring board on which a pattern of predetermined electrodes are formed and straightly cutting a part between the pair of the through-holes;

mounting a piezoelectric actuator made of a piezoelectric bi-morph device on the flexible wiring board so that the piezoelectric actuator bridges the pair of the through-holes and soldering and electrically connecting wiring terminals formed at one end portion of the piezoelectric actuator and the predetermined electrodes formed on the flexible wiring board;

pulling out the part formed between the pair of the through-holes in the flexible wiring board so that the part is positioned on the upper surface of the piezoelectric actuator; and

mounting the flexible wiring board so that the piezoelectric actuator contacts the panel except for the part formed between the pair of the through-holes in the flexible wiring board.

5 16. The method for producing the input apparatus as set forth in claim 15,

 wherein the soldering step is performed by solder-fixing the other end portion of the piezoelectric actuator and a portion that the flexible
10 wiring board contacts the piezoelectric actuator.

17. A portable electronic apparatus having the input apparatus as set forth in claim 1.

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